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厦门大学

硕 士 学 位 论 文

钢筋混凝土柱考虑预应力影响下抗水平性能及稳定分析

Influence of resisted horizontal vibratility and stability ability to the reinforced concrete column by pre-stressing force

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摘要

针对普通钢筋混凝土柱抵抗水平性能较弱的特点，考虑在柱中布置一定数量的预应力筋并施加有效预应力来改善这一状况。本文对钢筋混凝土柱考虑预应力影响下的抗水平性能、稳定效应以及由此而构建的整体预应力混凝土框架结构的抗水平性能进行分析研究，主要工作及结论如下：

（1）基于截面应变协调分析方法，经过分析推导得出钢筋混凝土柱考虑预应力影响下的水平荷载－位移求解公式，为分析钢筋混凝土柱抗水平性能提供了一定的理论依据。

（2）对钢筋混凝土柱考虑预应力影响下抗水平性能进行全过程非线性分析，研究了构件从开裂、屈服到极限状态下的水平承载力及刚度变化，同时对影响此类构件抗水平性能各种因素进行了分析，包括预应力强度比、配筋率、预加轴压比及外加轴压比，得出各种因素对此类构件抵抗水平性能的都有不同程度的影响。

（3）基于有限元软件 Ansys，对钢筋混凝土柱考虑预应力影响下抗水平性能进行了模拟分析，模拟结果与实验结果及理论计算结果吻合较好，说明模拟方法的正确性，同时对影响此类构件抗水平性能的各种因素进行了模拟分析，得出模拟结果与理论计算结果吻合较好，并进一步对考虑预应力影响下的钢筋混凝土柱框架结构抵抗水平性能及其他因素影响下性能的模拟分析。

（4）最后本文推导出钢筋混凝土柱考虑预应力影响下失稳的临界荷载计算公式，得出施加一定程度的预应力能有效提高失稳的临界荷载，并讨论了公式运用范围。

关键词：抗水平性能；Ansys；失稳

Abstract

Resist the weaker characteristic of horizontal vibration function in accordance with the ordinary reinforced concrete column, and thinks over by way of the pre-stressing force to fix up fixed quantity muscle in the column and exerts effective pre-stressing force in order to improve this condition. This article, to the resisted horizontal vibration function of the reinforced concrete to think over pre-stressing force to influence down column, stable effect as well as and the resisted horizontal vibration function constructing the entire pre-stressing force concrete framed structure built spreads out fixed research is chiefly worked and the conclusion as follows from this

(1) Base on the harmonious analysis method is met an emergency in the section, and that the derivation reaches the horizontal that the reinforced concrete column is thought over that the pre-stressing force influence down loads - formula is found the solution in the displacement, and raises the calculation efficiency by way of matlab procedure, and in order to analyze the reinforced concrete column is resisted that the horizontal vibration function provides the fixed theory basis.

(2) Think over to the reinforced concrete column that the pre-stressing force influences down the resisted horizontal vibration function carrying on the full course nonlinear analysis, and reaches this kind of member and ordinary reinforced concrete to go through similar development change, elasticity stage, elastoplasticity stage as well as plasticity stage that and the horizontal to study the member from cracks and subdues to the limit state is born the weight the power and stiffness changes; The various factors that the resisted horizontal of reinforced concrete column of the at the same time to influences is vibrated the function have been carried on the analysis fairly, including pre-stressing force intensity than and joins in marriage the muscle and adds the a spool pressure when more pressure in advance to compare, and reaches the various factors to resist the influence that all has the different level of horizontal vibration function to the reinforced concrete column.

(3) Base on the simulation analysis has been in progress to the resisting horizontal

vibration function of the reinforced concrete to think over pre-stressing force to influence the down column and the reinforced concrete column of other factors influences respectively by limited first software Ansys,; And resist the simulation analysis that horizontal vibration function and other factors influence down the function to the reinforced concrete to think over pre-stressing force to influence the down column framed structure further.

(4)The reinforced concrete column of pre-stressing force influence is gone out to think over .final this article derivation, and to lose steady (lee) critical loads the calculation formula, and reaches pre-stressing force exerting the fixed level effectively to rise to lose steady critical loads, and discusses the formula application scope.

The keyword: the resisted horizontal vibrated function; Ansys; loses steady(ly)

目录

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